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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/582,944

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Masaya Yamamoto

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38834

7590

04/28/2009

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EXAMINER

ANDREWS, MICHAEL

ART UNIT

PAPER NUMBER

2834

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/582,944	<b>Applicant(s)</b> YAMAMOTO ET AL.	
	<b>Examiner</b> MICHAEL ANDREWS	<b>Art Unit</b> 2834	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 18 May 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 May 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/15/2006</u> .   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

This Office Action is responsive to the Applicant's communication filed May 18, 2007. In virtue of this communication, claims 1-9 are pending in the instant application.

#### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

#### ***Drawings***

2. Figures 5(a) and 5(b) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

#### ***Disclosure Objections***

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The specification is objected to because of the following informalities:
  - [0002], line 7; replace "Fig. 3" with --Fig. 5--;
  - [0011], line 24; replace "53" with --54--;

- [0012], line 14; delete “a” between “and” and “feeder”.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 1-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboi et al. (Pub. No: US 2001/0048249 A1), hereinafter referred to as “Tsuboi”, in view of Moczala (Patent No: US 4,581,553) and Kelly (Patent No: US 5,703,417).

With regard to claim 1, Tsuboi discloses a moving magnet type linear actuator [1] (see [0015], lines 1-5; see figures 1-4 for all numerical references unless otherwise stated), comprising:

a stator unit including a stator base [2] (see [0048], lines 1-3) and an armature unit [10] having a magnetic core [11] (see [0054], lines 1-6) secured to the stator base and an armature winding [12] wound around the magnetic core (see [0050], lines 1-7);

a moving unit [3, 6, 13] including a field permanent magnet [13] (see [0052], lines 1-4) arranged so as to face the magnetic core via a magnetic first gap (The gap between the field permanent magnet and the magnetic core is clearly visible in figure 3.) and a magnet holder [3] (see [0048], lines 4-6) movably disposed on the stator base while holding the field permanent magnet,

Tsuboi does not expressly disclose a magnetic back yoke forming a magnetic second gap between it and the field permanent magnet or that the second gap is larger than the first, or that the magnet holder is made of a nonmagnetic material.

Moczala discloses a moving magnet type linear actuator (see figure 4; also col. 1, lines 7-10) wherein a magnetic back yoke [7] (see col. 6, lines 16-19) is arranged at an anti-armature side (The yoke is arranged above the mover and permanent magnet, just as it is in the instant application.) of the field permanent magnet [3, 4] (see col. 6, lines 40-43), and has a width approximately the same as a width of the field permanent magnet (This is implied by the fact that the components of the other embodiments all have the same width, as shown in figure 5.) and a length exceeding approximately a stroke of the moving unit, longitudinal ends of the magnetic back yoke being secured to

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the stator unit (The magnetic back yoke is shown in figure 4 extending the full length of the linear actuator, with one end depicted by dotted lines.), wherein a magnetic second gap is formed between the magnetic back yoke and the field permanent magnet (The gap is clearly shown in figure 4.).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the moving magnet type linear actuator of Tsuboi by adding a magnetic back yoke as taught by Moczala, for simplifying the construction thereof, since Moczala teaches that a linear motor according to his invention requires less material while providing high power output (see col. 1, lines 57-62).

While it is not expressly disclosed that the magnetic second gap is set to be larger than the magnetic first gap to offset magnetic attraction forces applied to the movable unit (The purpose of altering the gap sizes is an intended use and not a patentable distinction.), Moczala does disclose that varying air gap thicknesses have a significant effect on stray flux problems (see col. 5, lines 56-62). It has been held that, where the general conditions of claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the linear actuator of Tsuboi by varying the respective thicknesses of the magnetic air gaps as taught by Moczala, for maximizing the force produced by the motor, since Moczala teaches that minimizing pole pitch and pole tooth length, which must be an order of magnitude larger than the gap, increases the magnetic force produced (see col. 5, lines 64-68 and col. 6, lines 1-7).

The combination of Tsuboi and Moczala still does not expressly disclose that the magnet holder is made of nonmagnetic material.

Kelly discloses a linear motor [1] wherein the magnet holder [1a] (see figure 1) is made of nonmagnetic material (see col. 4, lines 1-6).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the moving magnet type linear actuator of Tsuboi and Moczala by forming the magnet holder from a nonmagnetic material as taught by Kelly, for reducing the magnetic material therein, since Kelly teaches that using less magnetic material reduces the cost of the motor (see col. 4, lines 25-30).

With regard to claim 2, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein the armature unit has an open slot (see figure 4 of Moczala). The combination does not expressly disclose that the magnetic first gap / the magnetic second gap is set to 0.45/0.55 to 0.35/0.65. However, as stated above, where the general conditions of claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. Thus, since Moczala discloses altering air gap thickness to control magnetic flux, determining the ideal gap thicknesses would have been obvious to one of ordinary skill in the art.

With regard to claim 3, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein the armature unit has a semi-open slot (see figure 4 of Moczala). The combination does

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not expressly disclose that the magnetic first gap / the magnetic second gap is set to 0.49/0.51 to 0.48/0.52. However, as stated above, where the general conditions of claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. Thus, since Moczala discloses altering air gap thickness to control magnetic flux, determining the ideal gap thicknesses would have been obvious to one of ordinary skill in the art.

With regard to claim 4, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein a scale portion [15] of a linear scale [14] is secured to the magnet holder [3], and wherein a detecting portion [16] of the linear scale [14] is secured to the stator base [2] so as to face the scale portion via a third gap (The physical arrangement of the components is clearly shown in figure 3 of Tsuboi, and described in [0050], lines 15-22).

With regard to claim 5, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 2 or 3, as stated above, wherein two linear guide rails [5] are extended in a longitudinal direction of the armature unit [10] and arranged in parallel at both sides of the armature unit [10], wherein guide blocks [6] are arranged on corresponding linear guide rails [5], and wherein the magnet holder [3] is secured to the guide blocks [6] (see figure 3 and [0048], lines 6-14 of Tsuboi).

With regard to claim 6, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 5, as stated above, wherein



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the field permanent magnet [13] is secured to the magnet holder [3] of nonmagnetic material (see col. 4, lines 1-6 of Kelly) having a width corresponding to a width direction space between the guide blocks [6] (see figure 3 of Tsuboi). The combination, however, does not explicitly teach securing the field permanent magnet [13] to the magnet holder [3] by inserting it into a hole formed in the magnet holder [3], and the field permanent magnet [13] is secured in the hole. However, this difference is not of patentable merit since the magnet attached to the holder is a finished product which can be made by any process. Therefore, to employ forming a hole and inserting the magnet to form the assembled mover of Tsuboi would have been obvious to one of ordinary skill in the art.

With regard to claim 7, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 5, as stated above, wherein a stopper mechanism [18, 20] (see figure 1 and [0051], lines 6-8 and 22-27 of Tsuboi) is provided at each of four ends of the two parallel linear guide rails [5] (The two stopper mechanisms shown extend across both guide rails at each end.).

With regard to claim 9, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 1, as stated above, wherein the magnetic back yoke [7] (see col. 6, lines 16-19 and figure 4 of Moczala) is constituted by a laminated member of thin board electromagnetic plates (While not explicitly stated, it is implied that the yoke is comprised of the same laminations as the opposing section [1] shown in figure 4, and described in col. 6, lines 14-16, of Moczala).

8. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuboi, Moczala, and Kelly as applied to claim 1 or 4 above, and further in view of Chitayat (Patent No: US 5,783,87).

With regard to claim 8, the combination of Tsuboi, Moczala, and Kelly discloses the moving magnet type linear actuator as recited in claim 1 or 4, as stated above, except that the combination does not expressly disclose that a conduit for a forced cooling liquid medium is embedded in the stator base.

Chitayat discloses a linear motor (see col. 1, lines 5-10) wherein a conduit [128, 130] (see figure 10) for a forced cooling liquid medium is embedded in the stator base [132] (see col. 9, lines 62-67 and col. 10, lines 3-9).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to implement the moving magnet type linear actuator of Tsuboi, Moczala, and Kelly by adding a conduit in the stator base as taught by Chitayat, for improving the cooling thereof, since Chitayat teaches that better cooling of linear motors allows for faster acceleration and increases their utility (see col. 1, lines 40-50).

#### ***Citation of Relevant Prior Art***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Prior art:

- Miyamoto et al. (Pub No: US 2007/0114854A1) discloses a moving magnet type linear actuator with a magnetic back yoke;

- Seki et al. (Patent No: US 6,661,124B1) discloses a linear motor with conduits for a forced cooling liquid medium;
- Fujisawa et al. (Pub No: US 2002/0021050A1) discloses a slider unit with built-in moving-coil linear motor;
- Tsuboi et al. (Pub No: US 2001/0054851A1) discloses a moving-magnet linear motor with position detection;
- Tozoni (Patent No: US 5,140,208) discloses a magnetic suspension system with a first and second magnetic gap.

### ***Inquiry***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Andrews whose telephone number is (571)270-7554. The examiner can normally be reached on Monday through Thursday between the hours of 8:30 and 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Quyen Leung can be reached at (571)272-8188. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Quyen Leung/  
Supervisory Patent Examiner, Art Unit 2834

/M. A./  
Examiner, Art Unit 4176